Remarks

The Examiner's careful review of the Application is appreciated.

On page 2 of the Office Action, the Examiner objected to the specification because of various informalities. Applicants have amended the specification as shown and believe it is now in good form.

On page 3 of the Office Action, the Examiner rejected claims 1 – 3 and 13 under 35 U.S.C. 102(b) as being anticipated by Payvar (US Patent 5,101,953). Applicants traverse this rejection for the reasons discussed herein and in view of the claims as now presented.

Payvar discloses a groove pattern for the paper-based friction facing on a wet clutch to elize the surface temperature of the friction facings and thus increase the thermal capacity of the clutch where there is continuous slippage. The groove pattern includes one or more continuous annular grooves dividing the friction area into two or more annular bands and a plurality of cross grooves in each band which are angled with respect to a radius of the facing. The angled cross grooves increase in number in each band from the inner band to the outer band. The angled cross grooves extend at an acute angle (10-50 degrees) to such radius. Slip of the friction pair of plates cause a viscous pumping action. The cross groove angle in each band of the facing is preferably different so as to keep all the grooves filled with cooling oil. And, the cross-section of the cross grooves vary in their dimensions as between the bands. The disclosed 60.degree. waffle pattern includes annular bands and cross grooves extending from the inner to outer perimeters of the facing at an angle of 60 degrees to the radius of the metal clutch plate. The angled cross grooves of this pattern also provides viscous pumping of oil through the facing.

In contrast, Applicants have amended claim 1 to recite that the plurality of second channels are in fluid communication with the first apertures and that the plurality of second channels comprise a first depth and the plurality of apertures comprise a second depth through the friction material, wherein the first and second depths are not equal. Payvar does not disclose this feature and in fact appears to teach away from such disclosure for several reasons. First, Payvar does not teach of a plurality of second channels in fluid communication with the first apertures at a predetermined location at the closed end of the plurality of first apertures. Moreover, Payvar fails to teach of the channels and apertures having different depths as recited in Applicants amended claim 1. For at least the foregoing reasons and in view of the claims as now presented, Applicants believe claim 1 is not anticipated by Payvar. Claims 2, 3 and 13 are dependent claims and contain limitations in addition to the limitations of claim 1 and accordingly, they are also not anticipated by Payvar.

On page 4 of the Office Action, the Examiner rejected claims 1 and 3 – 5 under 35 USC 102(b) as being anticipated by Hirayanagi et al. (U.S. Patent 6,062,367). For the reasons discussed above relative to the Payvar rejection, in view of the claims as now presented and also for the following reasons, Applicants believe that claims 1, 3 and 5 are not anticipated by Hirayanagi et al. Applicant has cancelled claim 4 in view of the amended claim 1 which contains the limitation of the second channels being located at the closed end of the plurality of apertures.

Hirayanagi et al. discloses a friction plate is constituted by a core plate, and friction members fixed respectively to opposite surfaces of the core plate. The friction member has oil passages, extending therethrough from its inner peripheral surface to its outer peripheral surface, and oil grooves which are open to the inner peripheral surface, but do not extend through the friction member. The area ratio of the oil grooves to the oil passages is 25% to 100%; and the width of the oil groove is not larger than the width of the oil passage. The length of the oil groove is not less than 1/4 of the length of the oil passage. It is not necessary that all of the oil grooves have the same length. Preferably, the width of the oil passage, as well as the width of the oil groove, is not more than 3 mm. The oil passages and the oil grooves may be inclined relative to the radial direction.

Again, note that the Hirayanagi et al. apertures do not show a closed end aperture in fluid communication with a second channel as recited in Applicants' claim 1. The reference also fails to teach of providing the second channels and the apertures at different depths as is also now required by Applicants claim 1. In view of the foregoing and in view of the claims as now presented, Applicants believe that claim 1, 3 and 5 are not anticipated by Hirayanagi et al. and should be allowed.

On page 4 of the Office Action, the Examiner rejected claim 27 under 35 USC 102(b) as being anticipated by Staub, Jr. (U.S. Patent 4,287,978). In view of the claims as now presented, for the reasons discussed above and also for the following reasons, Applicants respectfully traverse the rejection of claim 27.

Staub, Jr. discloses an annular friction disc has a flat friction surface on each side of a flat steel plate with each friction surface having a plurality of radially extending grooves formed therein. Each groove has a flat bottom portion which extends between the inner and outer circumference of the friction surface and is displaced axially from the friction surface at the inner circumference and is contiguous with the friction surface at the outer circumference. Each groove also has a pair of tapered side walls extending between the bottom portion and the adjacent flat friction surface.

Staub, Jr. fails to teach of a plurality of apertures and a plurality of second channels as required by Applicants' claim 27. Moreover, the reference fails to teach of a plurality of channels comprising a shallow area and a deep area for permitting fluid to flow from a first area across a surface of the friction material, to a second area. In fact, it appears that the reference actually teaches away from such limitation in that the end of the Staub, Jr. channel is closed relative to the friction member against which the material cooperates. As stated at column 2, lines 37 – 42, the slanted surfaces 30 and 28 provide a separating force between the disks 10 and 34. This force could not exist without the end of the channel being closed.

In contrast, Applicants' claim 27 requires that the plurality of channels comprising a shallow area and deep area for permitting fluid to flow across a surface of the facing material. Moreover, the claim 27 also requires that the shallow area and the deep area extend depths or thicknesses through the facing material. Accordingly, Applicants believe claim 27 is patentable over Staub, Jr.

On page 4 of the Office Action, the Examiner rejected claims 27 – 31 under 35 USC 102 (B) as being anticipated by Kanbe et al. (U.S. Patent 4,139,085). In view of the claims as now presented and for the reasons discussed above, and also for the foregoing reasons, Applicants believe that the claims 27 – 31 are not anticipated by Kanbe et al.

Kanbe et al. discloses a clutch of the single-plate dry-disc type is structured to include annular friction facings secured to opposite surfaces of a supporting plate of a clutch plate and a plurality of recesses or shallow grooves are defined in the surface of one of the annular friction facings. The shallow grooves extend from the inner periphery of the one annular friction facing and terminate short of the outer periphery thereof. Accelerated air streams are introduced from the exterior through the fly wheel into the plurality of grooves so as to aid in separation of the friction facing of the clutch plate from the engaging surface of a fly wheel as a result of a hydrodynamic force created by the air streams. Furthermore, slots are defined in the surface of the friction facing in addition to the grooves so as to provide discharge passages for powder which has been produced due to wear or attrition of the friction facings.

There is no teaching in Kanbe et al. that suggests a channel extending through or across a surface of the material from a first area to a second area and wherein the channel has a deep area and a shallow area. To the contrary, Kanbe et al. appears to actually teach away from such teaching because, as viewed in Fig. 6A – 7H virtually all the channels in Kanbe et al. do not extend across the surface of the friction material and each have a maximum depth and do not appear to have a shallow area and a deep area as recited in Applicants' claim 27. Accordingly, Applicants believe claim 27 is not anticipated by Kanbe et al.

Regarding claim 28, Applicants note that Kanbe et al. also fails to teach of a shallow area having a depth or thickness through the friction material of less than 100 percent of the friction material along with the other limitations of claim 27 from which this claim originally depended. Applicants have rewritten this claim in independent form as shown to provide more comprehensive coverage of Applicants' invention that is covered by this claim.

Claim 29 depends directly from claim 28 and for the reasons discussed above relative to the rejections of claims 27 and 28, Applicants believe that this claim is also in condition for allowance.

Claim 30 has also been rewritten in independent form and for the reasons discussed above relative to the rejections of claims 27 – 29, Applicants believe that this claim is also in condition for allowance. Note that claim 30 discloses the step of intermixing a plurality of channels with a plurality of second channels that do not comprise a combination of shallow areas and deep areas. None of the references, whether taken alone or in combination, teach of this combination of channels, wherein at least some of the channels have a shallow area and a deep area.

Note also claim 31 recites that the second plurality of channels (i.e., the plurality of channels that do not comprise a combination of shallow area and deep area) does not extend completely across the base of the friction material. Again, none of the references teach of this mixture of channels. Indeed, it appears that Kanbe actually teaches away from such mixtures because it requires the closed channels of 6A – 7H without any mixture of channels that extend through the width or across the surface of the friction material, without any change in depth.

On page 5 of the Office Action, the Examiner rejected claims 7 – 12 and 14 – 26 under 35 USC 103(a) as being unpatentable over Payvar. For the reasons discussed earlier herein relative to the Payvar reference, in view of the claims as now presented and also for the following reasons, Applicants believe that claims 7 – 12 and 14 – 26 are also not taught by the Payvar reference.

Applicants can find no teaching in the references which suggests forcing a platen (claim 7) into the friction material so that the plurality of ribs form at least one of the second channels at the closed end of the plurality of apertures. Claims 8 and 9 contain different limitations in that claim 8 requires that the plurality of second channels is provided at each of the closed end of the plurality of apertures and claim 9 requires that the plurality of second channels are provided at some but not all of the closed ends of the plurality of apertures. For at least the foregoing reasons, Applicants respectfully traverses the Examiner's statement that these features would be obvious matter of design choice and respectfully requests the Examiner's support for such statements in that none of the references appear to show lasering or embossing channels as recited in Applicants' claims as presented. Indeed, the prior art appears to teach away from such limitations of lasering and embossing and certainly of driving a heated platen into the friction material to form channels in communication with the apertures because the prior art typically used machining steps to perform the forming of the channels, such as the channels shown in Payvar.

Applicants have mentioned in the specification some of the objects of Applicants' invention is to provide an improved method for forming the friction material. Applicants respectfully traverses the Examiner's statement that it is an obvious matter of design choice to form the channels by a heated platen, laser or embossing. Indeed, Payvar actually teaches away from such methods of forming because it requires that the grooves actually be machined. Applicants' invention actually reduces the need for machining the material in the manner shown by Payvar.

Regarding claims 11 and 12, please note that Applicants are not claiming a clutch plate or synchronizer ring alone, per se, but rather as a support member upon which the friction material is mounted and having the plurality of apertures and second channels as recited in claim 10 from which claims 11 and 12 directly depend.

Regarding claim 18, Applicants respectfully traverses the Examiner's statement that it is old and well-known in the art to stamp a friction material. Again, Applicants are not claiming a friction material alone, per se, but rather the method steps as recited in claim 18 which require that a friction material be provided with a plurality of apertures and that the friction material is stamped from a web with the plurality of second channels provided therein and prior to the situating step (i.e., prior to the friction material being placed on the support member). This enables the channels to be created prior to mounting the friction material onto the support member. Applicants have amended claim 18 to further focus on this feature. For all the foregoing reasons and in view of the claims as now presented, Applicants believe the pending claims are now in condition for allowance and should be allowed.

Applicant is filing concurrently under separate cover a request for a one month extension of time.

The Commissioner is hereby authorized to charge any additional fees under 37 C.F.R. 1.16 and 1.17 which may be required by this paper, or to credit any overpayment, to **Deposit Account No. 50-1287**. Applicants hereby provide a general request for any extension of time which may be required at any time during the prosecution of the application. The Commissioner is also authorized to charge any fees which have not been previously paid for by check and which are required during the prosecution of this application to **Deposit Account No. 50-1287**. (Should Deposit Account No. **50-1287** be deficient, please charge any further deficiencies to Deposit Account No. 10-0220.)

Applicants invite the Examiner to contact the undersigned via telephone with any questions or comments regarding this case. **Applicants respectfully request an interview with the Examiner is this Amendment does not place this case in condition for allowance.**

Reconsideration and favorable action are respectfully requested.

Respectfully Submitted,

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